

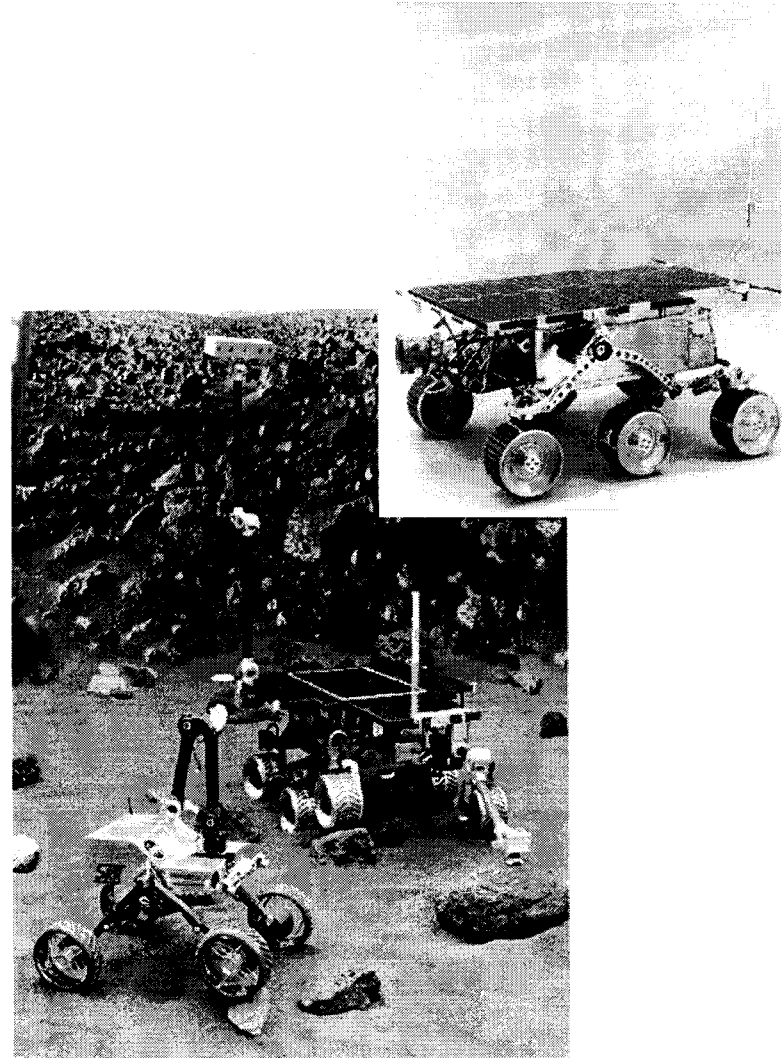
# Composites for Advanced Spacecraft Systems

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Composites At Lake Louise '99,  
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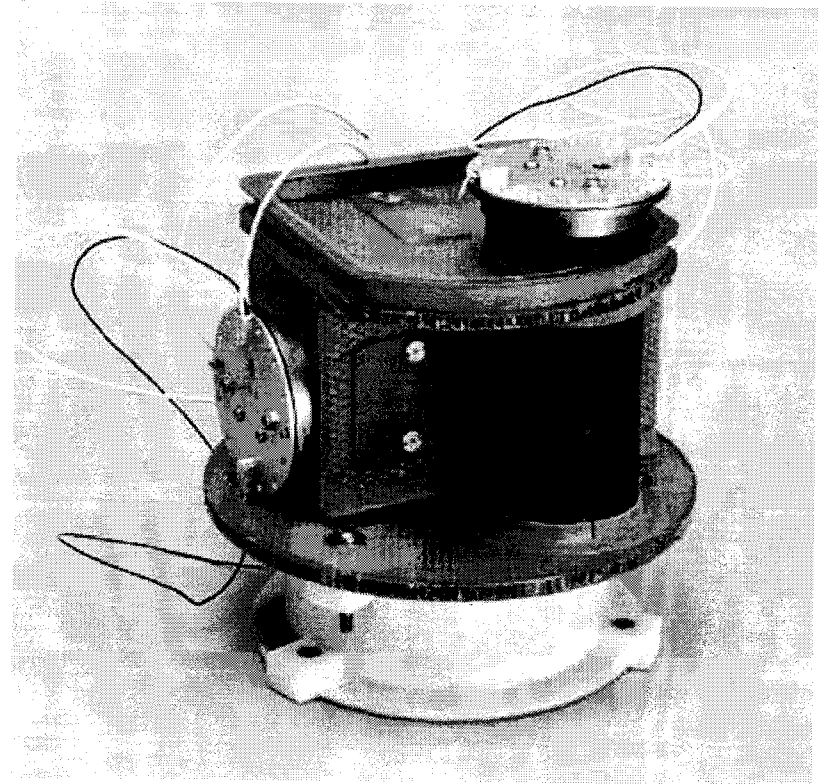
# Planetary Rovers

- Light weight Structural composites are extensively used in planetary rovers to provide thermal enclosures, high stiffness robotic arms, and low mass structures



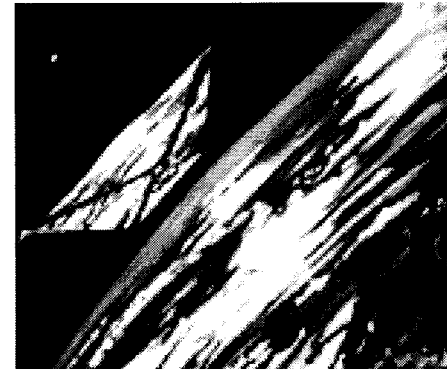
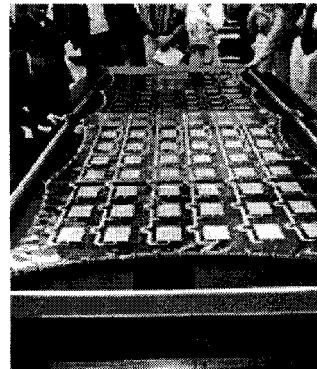
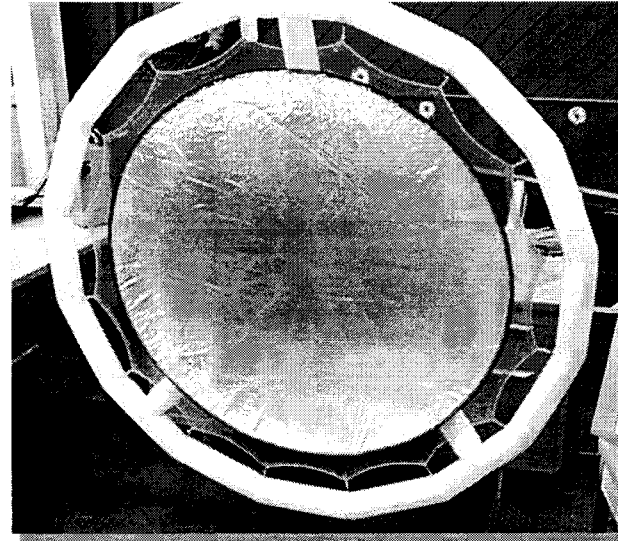
# Advanced Scientific Instruments

- Composites provide dimensional stability in extreme thermal and radiation environments



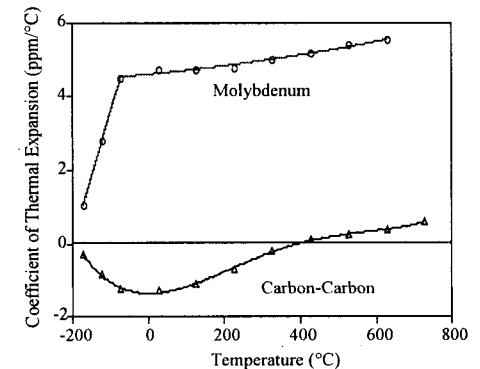
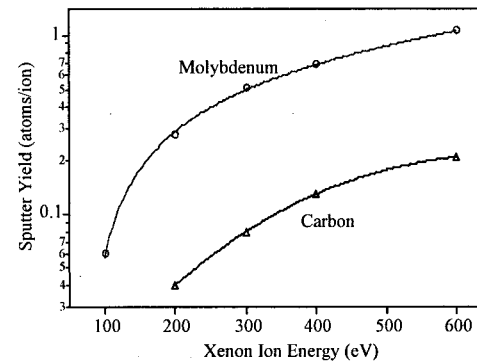
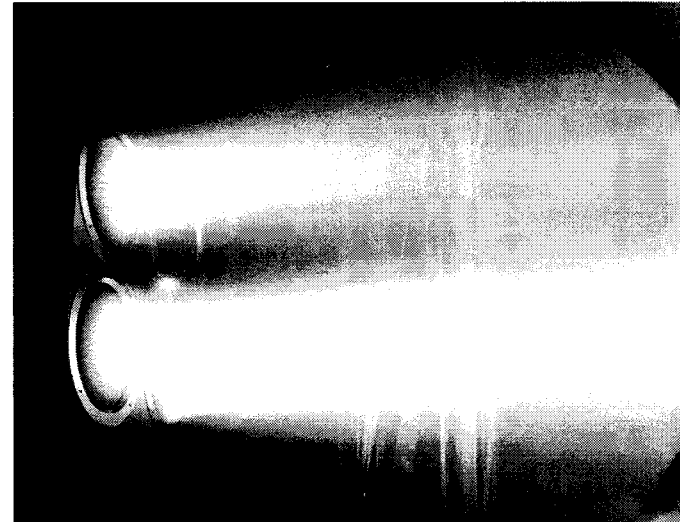
# Inflatable and Gossamer Structures

- Current development in inflatable and gossamer structures aim to develop booms, solar sails, sunshades, antennas, arrays, reflectors, rovers and others novel applications



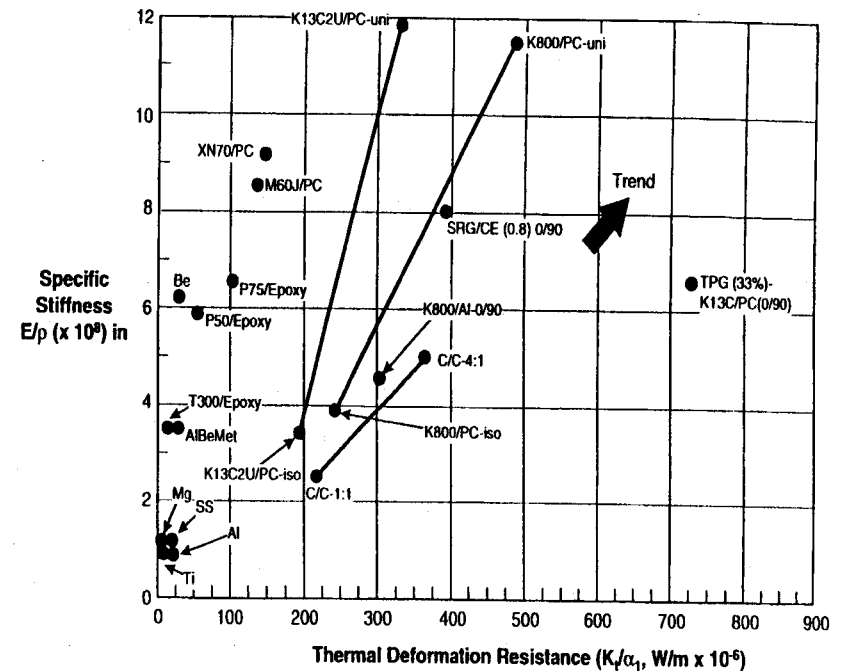
# Electric Propulsion

- Carbon-Carbon composites are becoming an enabling technology in electric propulsion to extend performance lifetimes, improve dimensional stability and reduce mass



# Thermal Management

- Advances in high conductivity graphite fibers enable novel thermal management designs and applications

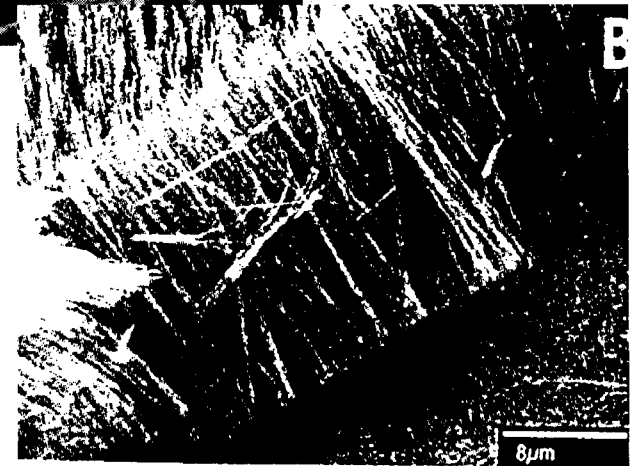


# Nanolaminate and Nanotubes

- Nanolaminate materials and nanotubes will open up new classes of structures, instruments and electronic applications

304 Stainless Steel - Zirconium

$d=20.1 \text{ nm}$ ,  $N = 1301$   
 $16.8 \text{ nm 304 SS} + 3.6 \text{ nm Zr}$



# Acknowledgments

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